



Enterprise Modeling - A System Dynamics Approach

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Achieving Human Resource Solutions Through Innovative Research

~~The Mission~~ Problem

NPRST

Right Person

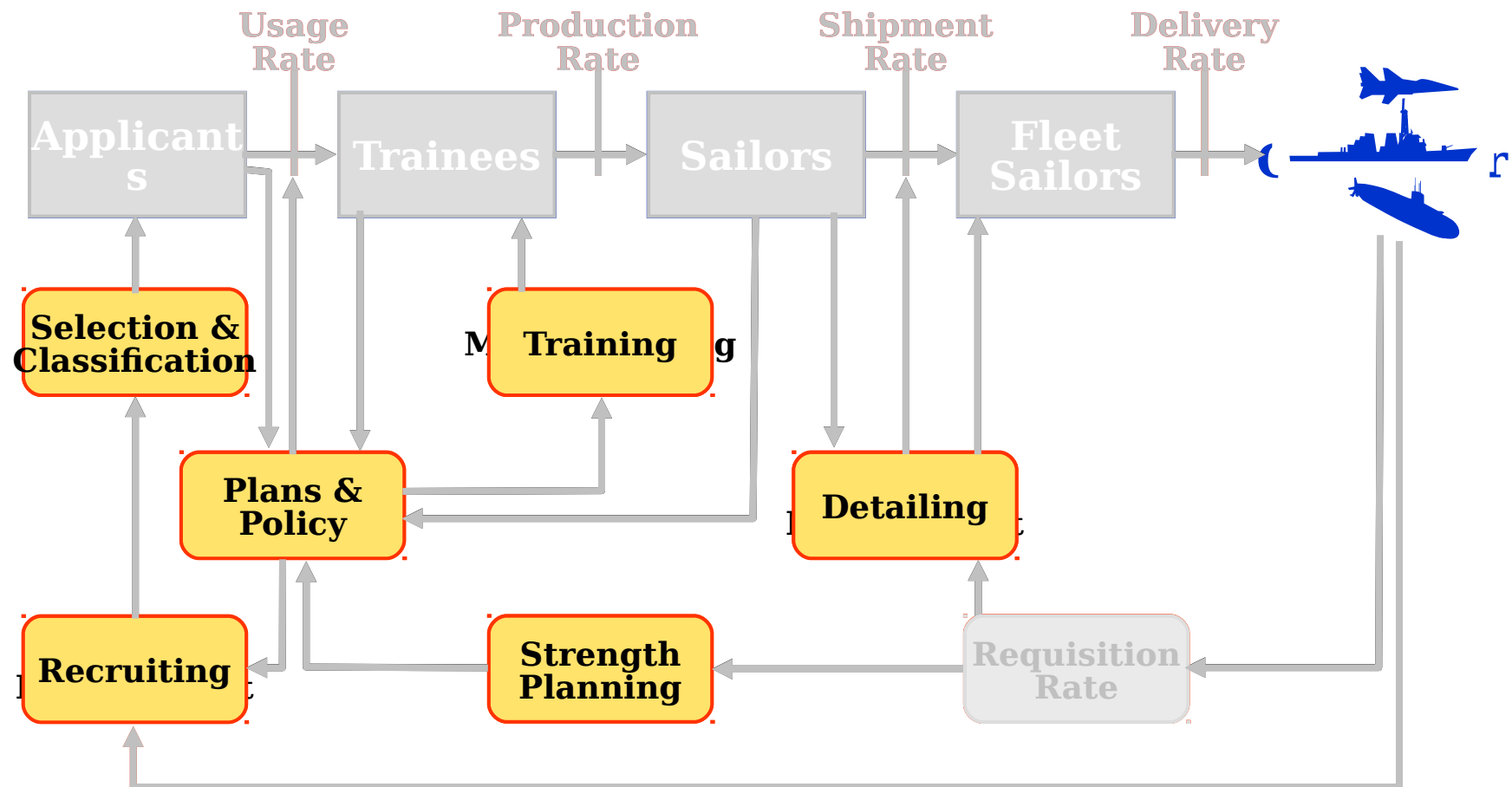
Right Place

Right Time

...if
*Right
Resources*
are available

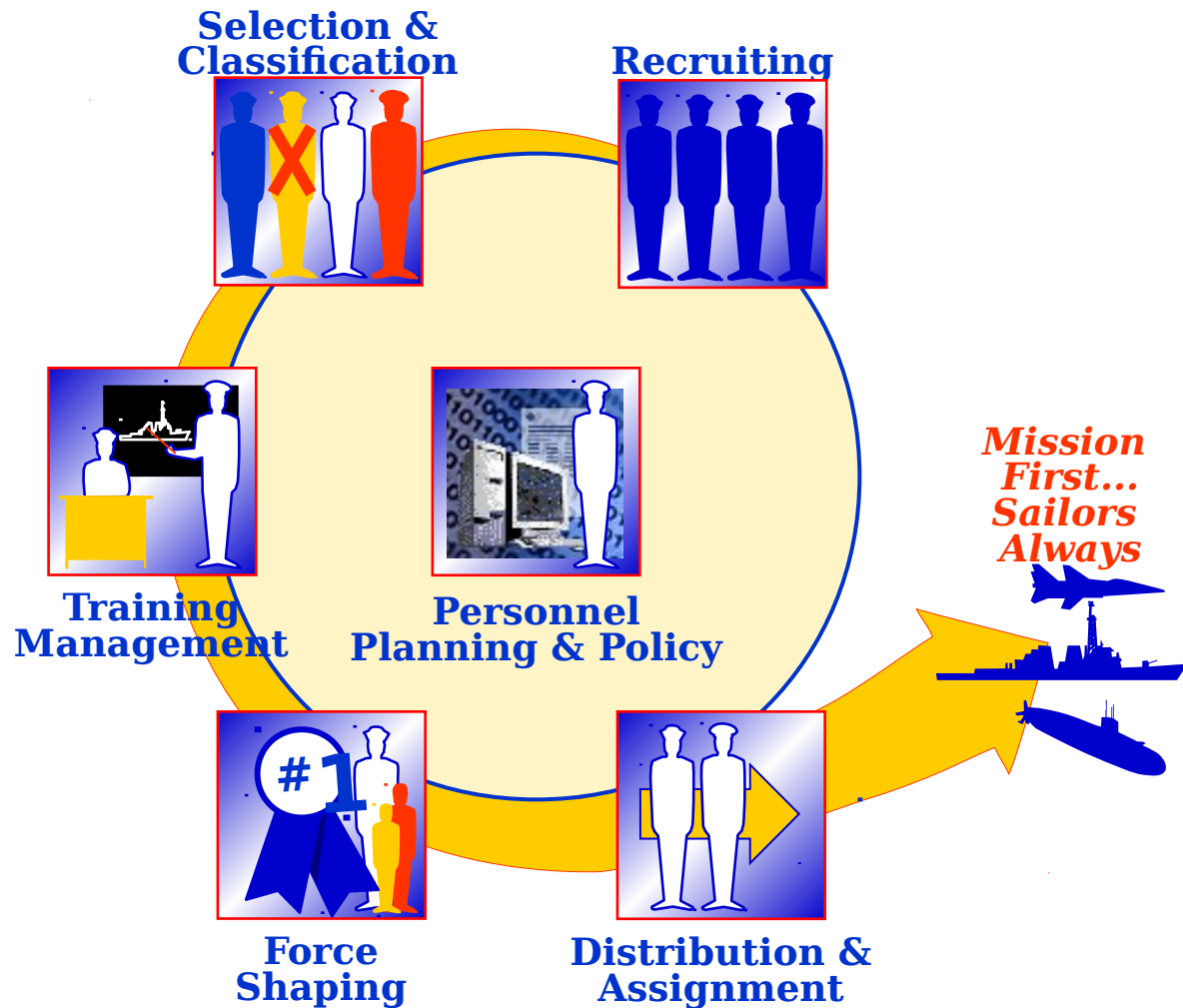
Supply Chain Management Model

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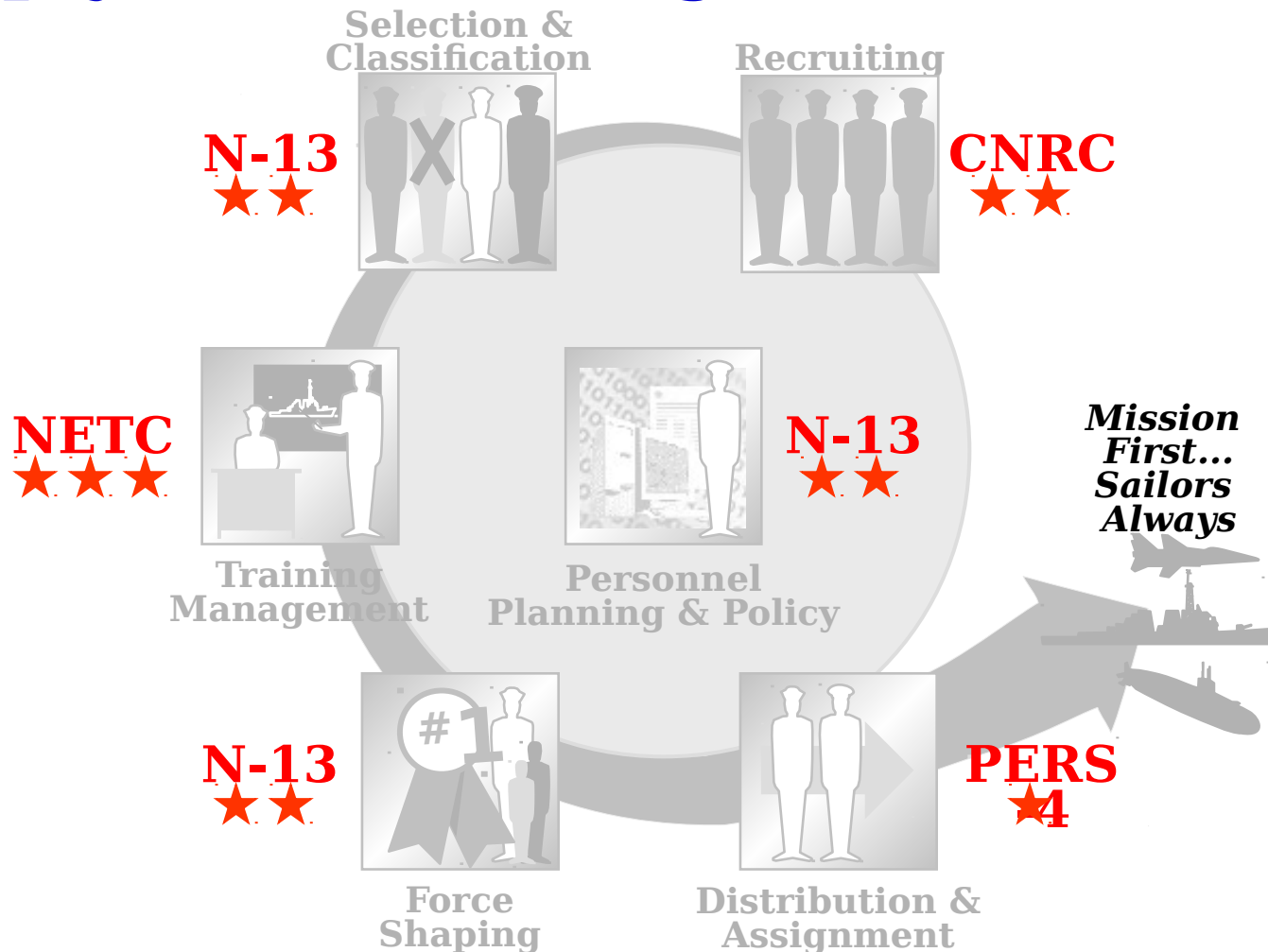
Navy Manpower and Personnel Supply Process

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Navy Manpower and Personnel Supply Process - Organization

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Motivation

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- **Analyst and Decision Makers “need to be able to determine the impact of changes, and/or proposed changes, on other functional components of the enterprise, NPRST”**

Modeling Objectives

- **Advanced “early warning” system**
Identify potential problems and opportunities
- **Executive flight simulator**
“What-if” analysis to evaluate alternatives
- **Training platform for decision makers**
Facilitate in-depth understanding of the enterprise

Comprehensive, Optimal Manpower Personnel Analysis Support System (COMPASS)

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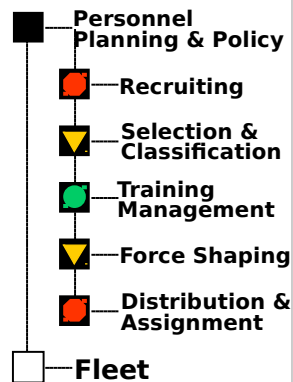
- Think of a BG Commander's situation room

Many sensors, weapons, decision aids
- Extend the analogy to the Navy's personnel environment
- Consider internal and external threats
- We have good decision aids ...but inadequate detection and "early warning" capability





Strategic Planning Model -- Recruiting @ 8 months



Recruiting

Value 1: \$ M

Value 2: \$ M

Selection & Classification

Value 3: Years

Value 4: Years

Training Management

Value 5: Sailors

Value 6: Sailors

Career Development

Distribution & Assignment

Analysis:

Start Date DD/MM/YYYY

End Date DD/MM/YYYY

How is System Dynamics Appropriate?

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- **System dynamics** takes the information about a system's structure that normally remains hidden in mental models and formalizes it into a computer model. It is a powerful tool for understanding complex problems
- **Dynamic** implies constant change, and, indeed, that is what dynamic systems do -- they change over time

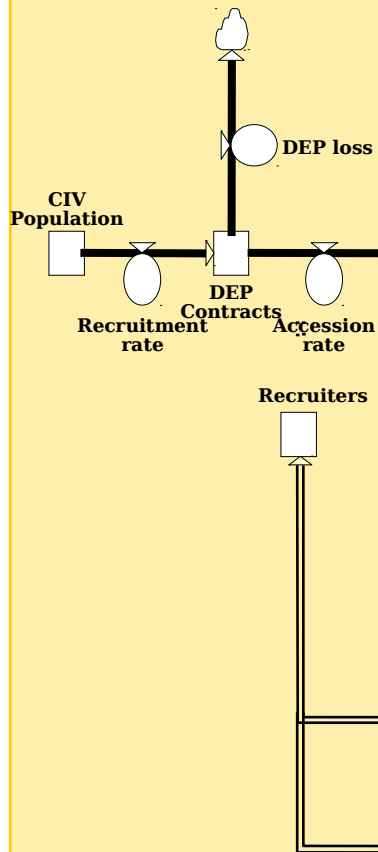
Key Assumptions/Rules

- **Navy personnel system - as a supply chain**
- **Continuous time-based process**
- **Three primary functions (Recruiting, Training, Fleet)**
- **Seven primary inventories of people (DEPs, Basic Training, Advanced Training, Fleet, Recruiters, Trainers, and Non-Distributable)**
- **Economy effects on recruiting and retention**
- **Four major metrics (money, quality, location, and quantity)**
- **Aggregated ALL Navy - Enlisted**

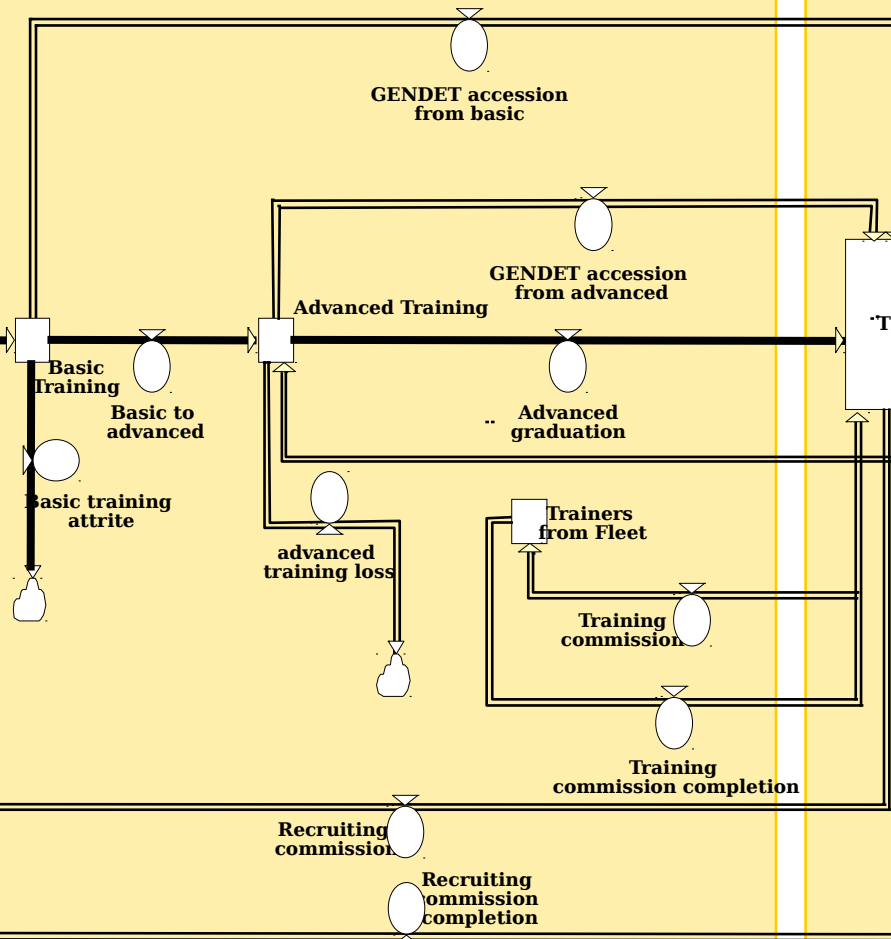
Data (a priori estimates)

- **Direct observation**
- **Educated guesses (subject matter experts)**
- **Similar parameters from other applications**
- **Refinement of initial estimates via calibration**

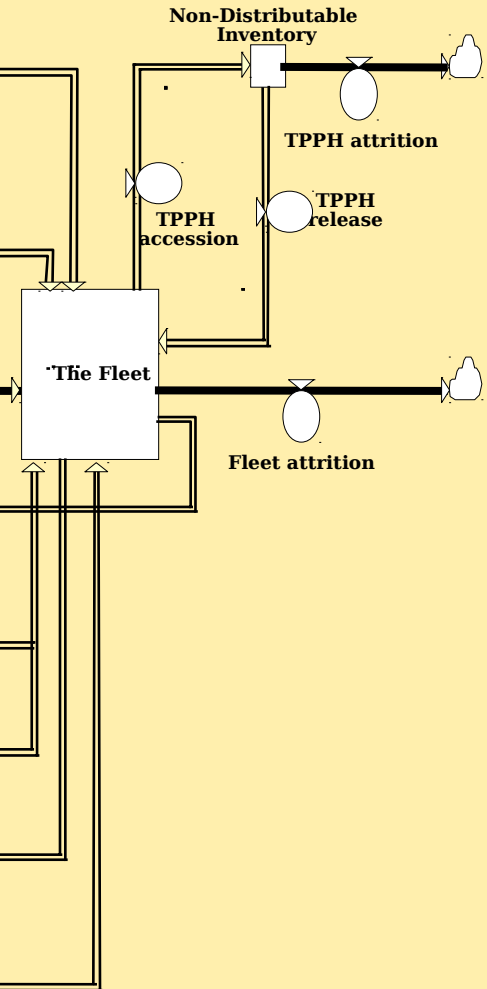
Recruiting



Training



The Fleet

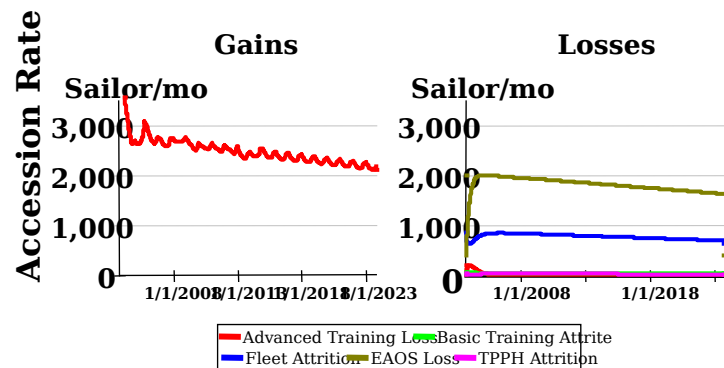
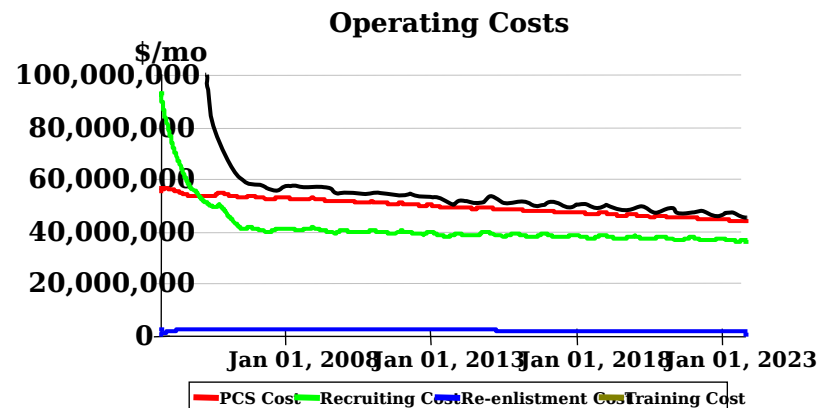
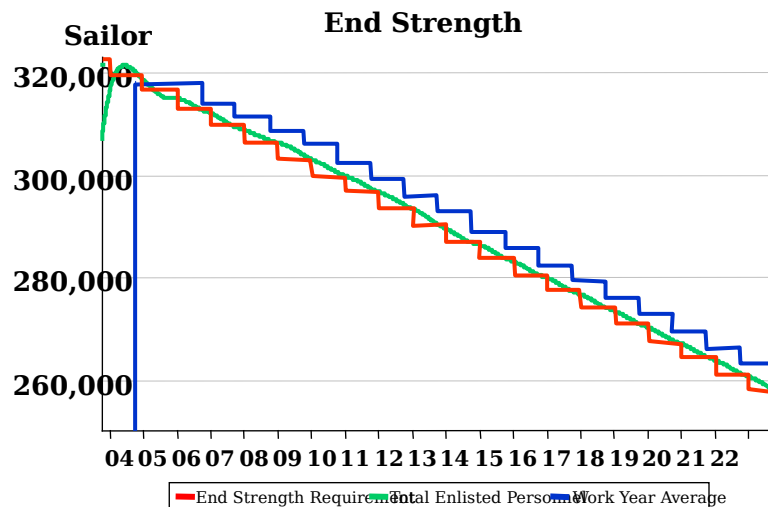


Analysis Scenarios

Scenario	Model Analysis	Metrics
The Navy intends to cut about 40,000 officers and enlisted personnel over six years to gain the money needed to buy new, more efficient and more capable aircraft and ships.	(1) The “end strength requirement” will be reduced by 40,000 in various increments, (2) Adjust recruiter productivity, (3) Adjust DEP contract length, (4) Adjust economy conditions (average, good, bad), etc.	(1) Operating costs, (2) cumulative gap, (3) gains, (4) losses, (5) Work Year Average, (6) Inventories, etc.
What is the impact on the DEP attrition if the Navy were to reduce the “DEP contract length”	(1) Adjust the nominal DEP contract length, (2) Adjust the end strength requirement, (3) Adjust economy	(1) Operating costs, (2) cumulative gap, (3) gains, (4) DEP attrition, (5) Work Year Average, (6) Inventories, etc.

Scorecard - Results Analysis

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644,650.29
Sailor

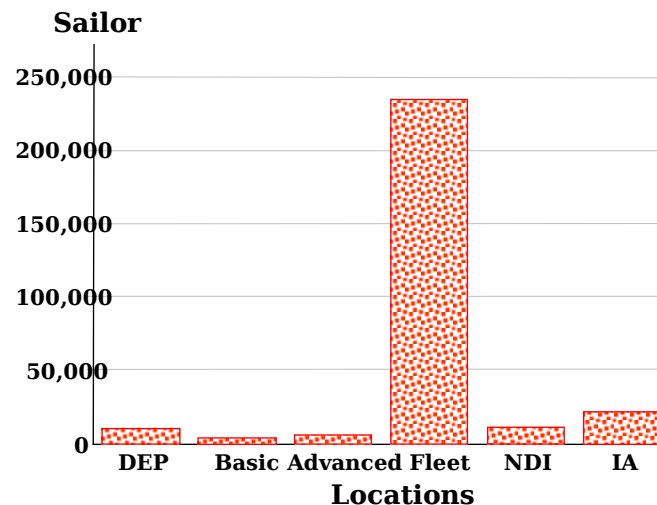
Total Losses

39,441,148,906.96 \$

Cummulative Operating Costs

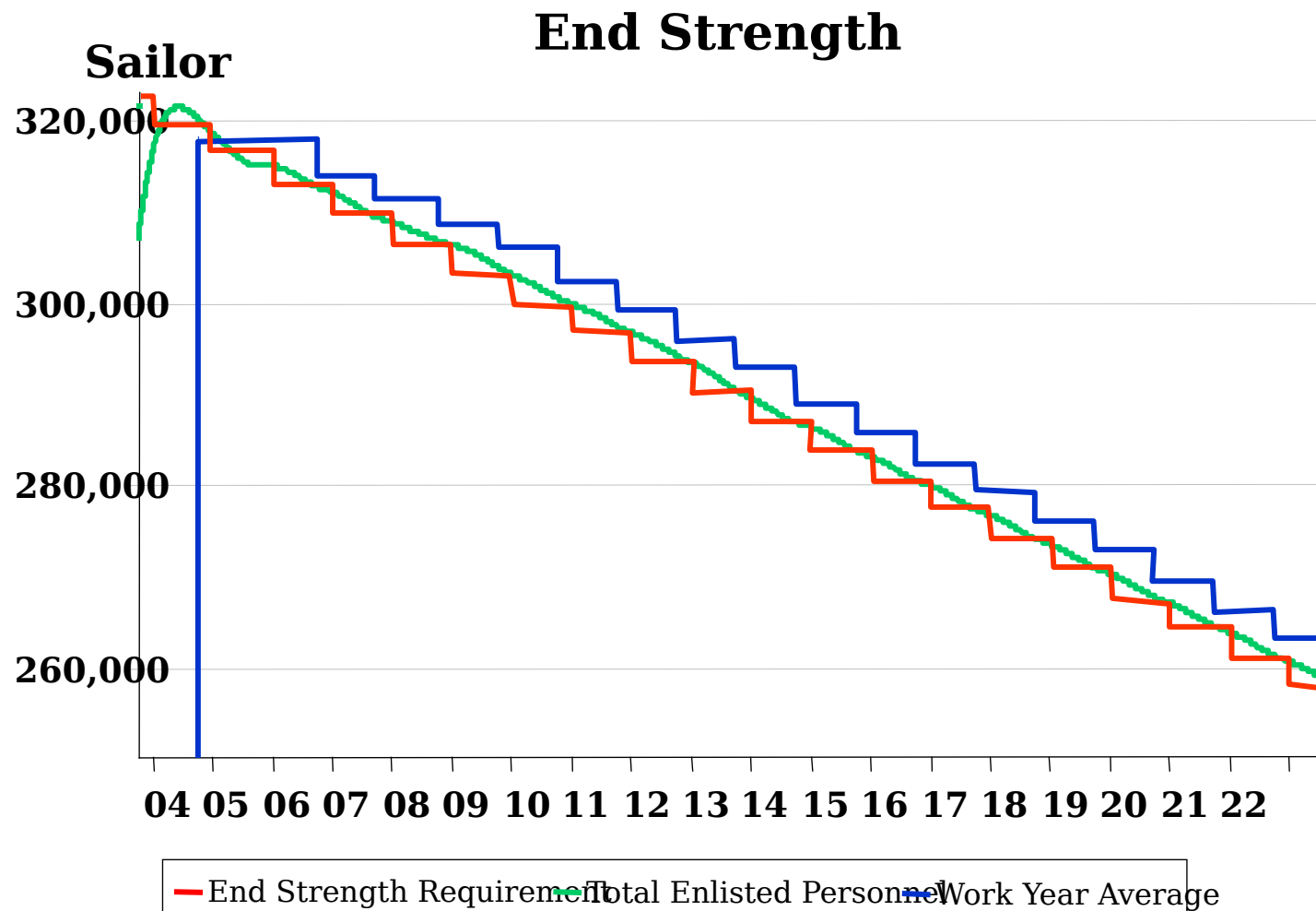
273,169.58
Sailor

Cummulative Gap



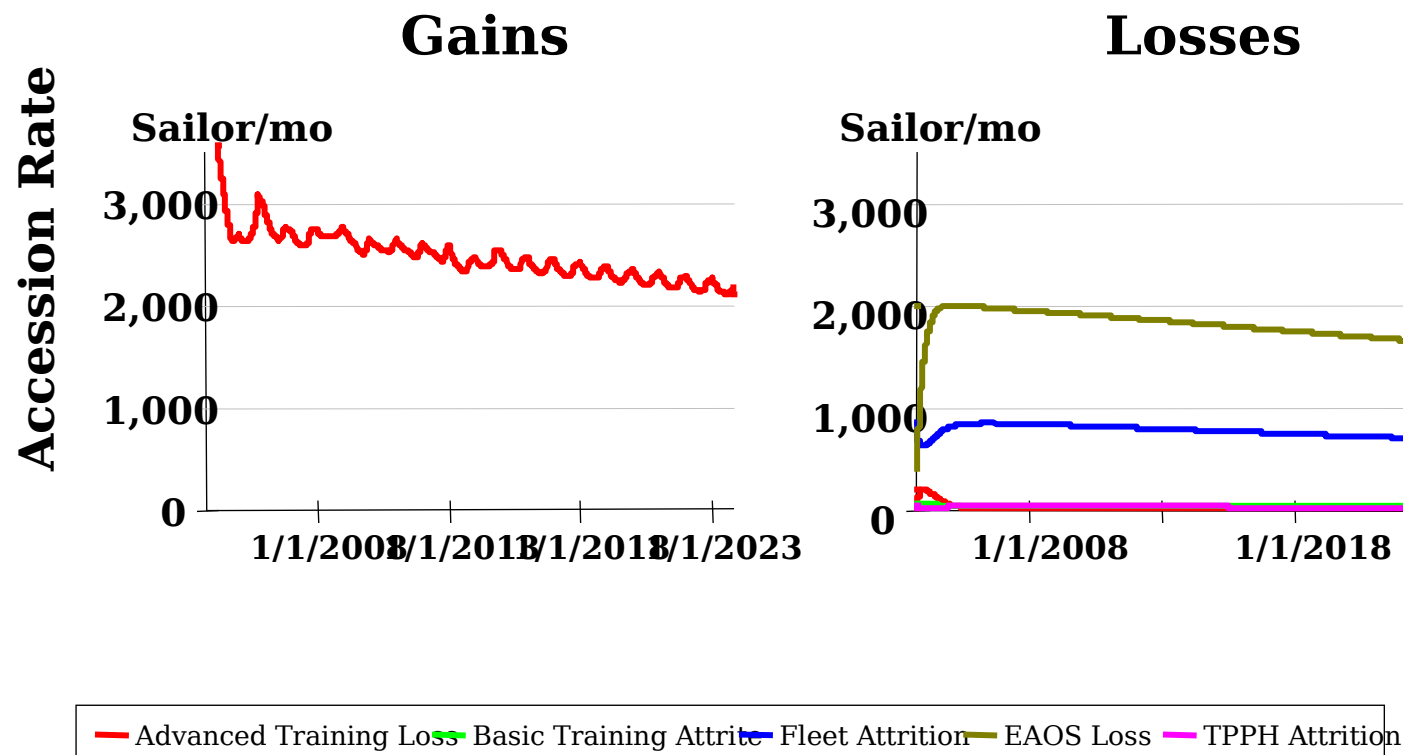
Scorecard - Results Analysis

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Scorecard - Results Analysis

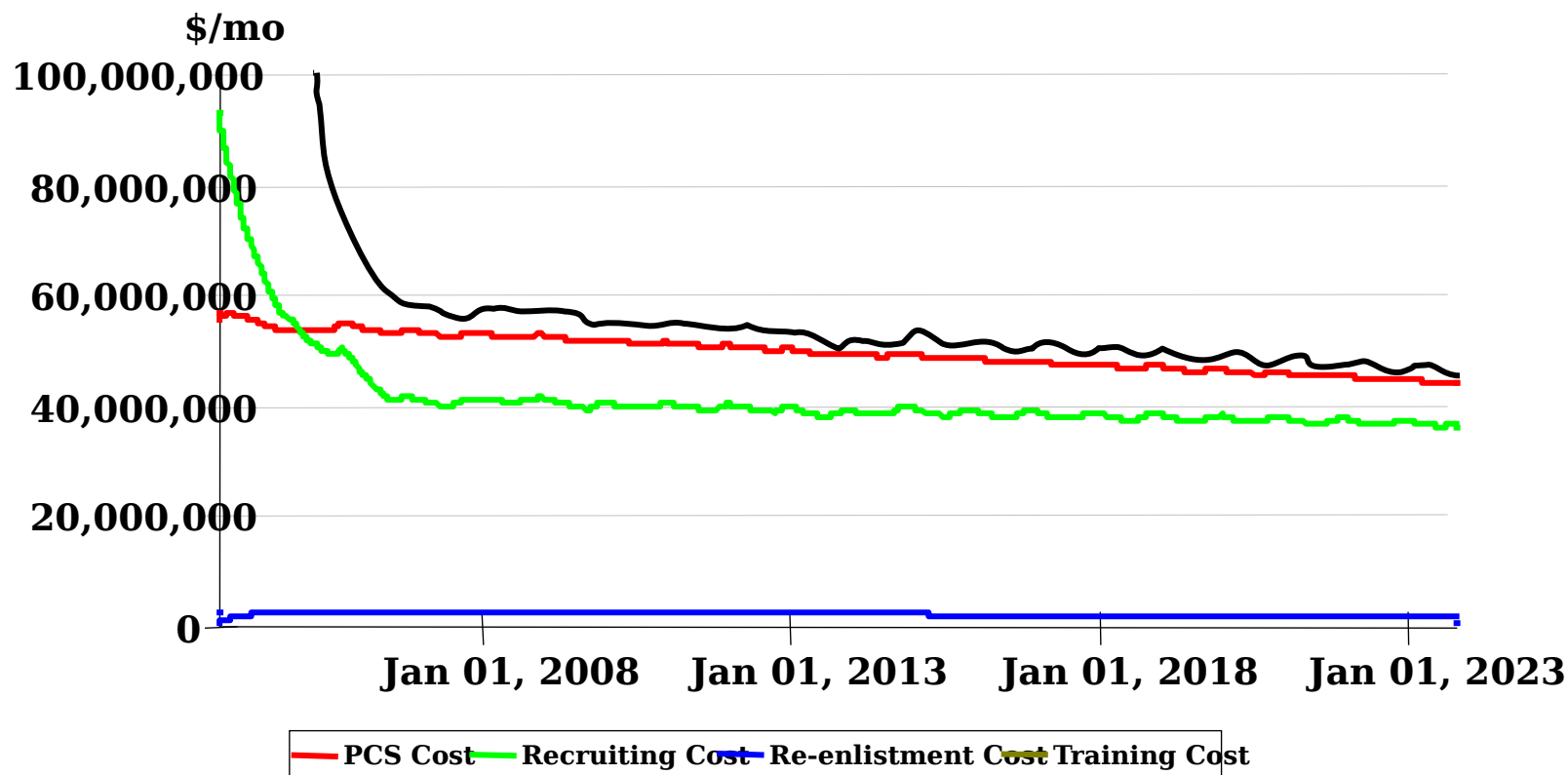
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Scorecard - Results Analysis

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Operating Costs



Scorecard - Results Analysis

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Sailor

Total Losses

39,441,148,90

6.96 \$

Cummulative Operating Costs

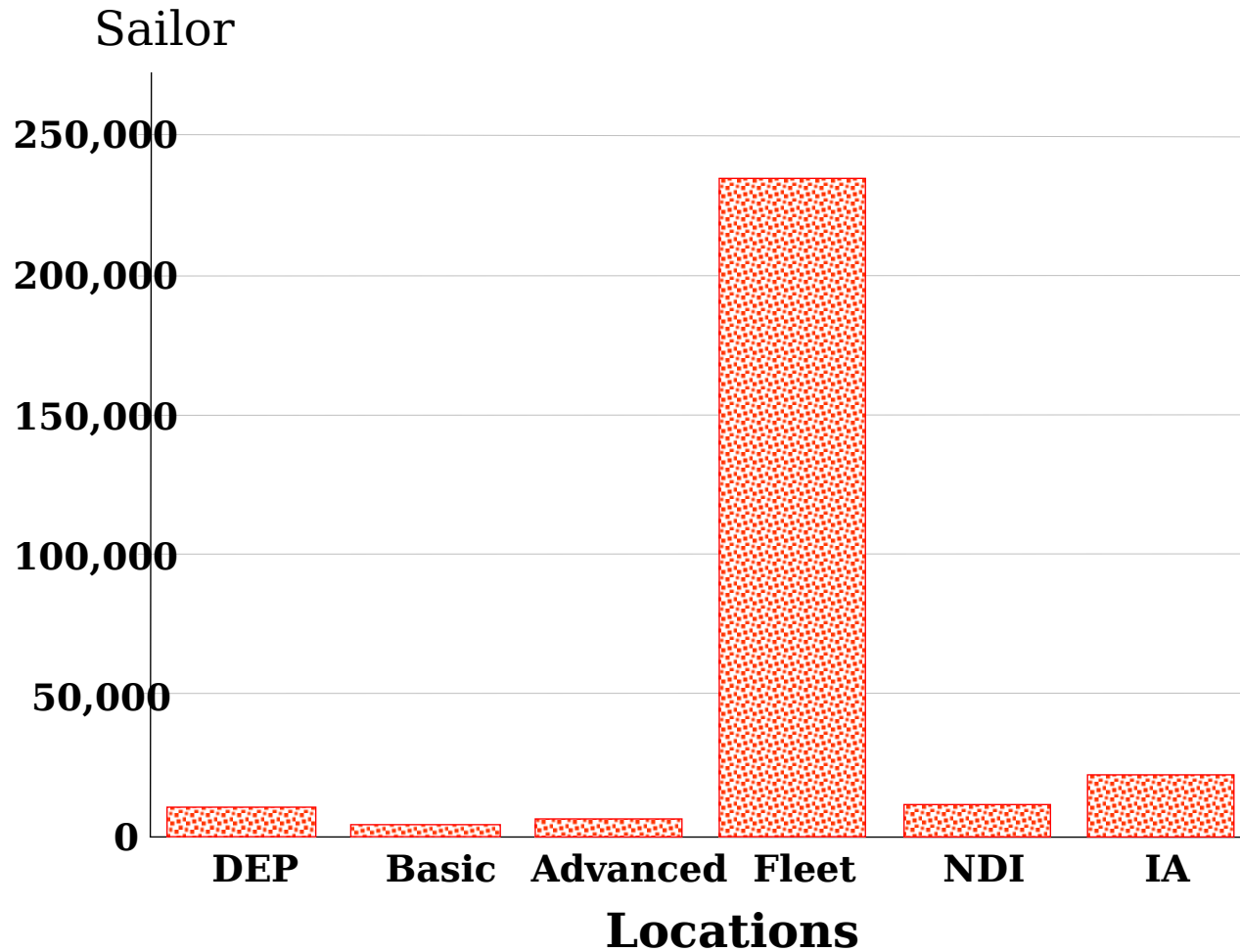
273,169.58

Sailor

Cummulative Gap

Scorecard - Results Analysis

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Backup Slides

Achieving Human Resource Solutions Through Innovative Research

Definitions

NPRST

- **Supply Chain**

Refers to the supply of materials/components/products in support of business operations

- **Navy personnel enterprise**

Structure, processes, information, resources, and constraints that makeup the Navy's personnel business

- **Model**

Computational representation of the structure, processes, information, resources, and constraints